AGARD Reports a quarterly listing

June 1995

NUMBER 95-2

April 1, 1995 through June 30, 1995

This is a listing of unclassified AGARD publications NASA received and announced in the NASA abstract journal, *Scientific and Technical Aerospace Reports (STAR)*, during the quarter cited above. Reports on the list may be requested by U.S. AGARD Panel Members by accession number (e.g., N95-16562) from the NASA Center for AeroSpace Information, 800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934. Requests may also be made by telephone (301) 621-0390, fax (301) 621-0134, or the Internet 'help@sti.nasa.gov.' Where stock permits, requests will be filled with printed copies; if printed copies are not available, microfiche copies will be supplied.

N95-16562# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.
OPTIMUM DESIGN METHODS FOR AERODYNAMICS [LES METHODES DE CONCEPTION OPTIMALE POUR L'AERODYNAMIQUE]
Nov. 1994 270 p Special course held in Rhode-Saint-Genese, Belgium, 25-29 Apr. 1994; sponsored by AGARD and VKI
(AGARD-R-803; ISBN-92-836-1007-5) Copyright Avail: CASI HC A12/MF A03

The course addresses the ingredients of new algorithms for accurate and cost effective numerical solutions of design problems. A special emphasis is given to the following topics: fundamental mathematical properties of methodologies for solving optimization problems using control theory and variational formulations; numerical aspects of fast algorithms coupling constrained optimizers and flow analysis solvers and their implementation; geometric representations and choice of design variables; and real life 3-D applications encountered in Aerospace Engineering in order to demonstrate the usefulness of these design methodologies to practical design problems. For individual titles, see N95-16563 through N95-16573.

N95-17278# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Propulsion and Energetics Panel.
EXPERIMENTAL AND ANALYTICAL METHODS FOR THE DETERMINATION OF CONNECTED-PIPE RAMJET AND DUCTED ROCKET INTERNAL PERFORMANCE [METHODES EXPERIMENTALES ET ANALYTIQUES POUR LA DETERMINATION EN CONDUITE FORCEE DES PERFORMANCES DES STATOREACTEURS ET DES STATOFUSEES]
Jul. 1994 103 p
(AGARD-AR-323; ISBN-92-835-0755-X) Copyright Avail: CASI HC A06/MF A02

Connected-pipe, subsonic combustion ramjet and ducted rocket performance determination procedures used by the NATO countries have been reviewed and evaluated. A working document has been produced which provides recommended methods for reporting test results and delineates the parameters that are required to be measured. Explanations and detailed numerical examples are presented covering the determination of both theoretical and experimental performances, the use of air heaters and uncertainty and error analysis. Author

N95-17388# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Flight Mechanics Panel.
AIRCRAFT AND SUB-SYSTEM CERTIFICATION BY PILOTED SIMULATION [HOMOLOGATION DES AERONEFS ET DE LEURS SOUS-SYSTEMES PAR LA SIMULATION PILOTEE]
Sep. 1994 53 p
(AGARD-AR-278; ISBN-92-835-0757-6) Copyright Avail: CASI HC A04/MF A01

There is a steadily increasing tendency to use piloted flight simulators for official clearance of selected areas of flight envelopes and of system behavior or malfunctions. This is a natural and desirable evolution from the wide use of simulation during the development of new aircraft. However, there is a lack of guidance for certification authorities and aircraft manufacturers on simulation standards, validation procedures and general information on the advantages and disadvantages of using simulation as part of a clearance program. This could lead to either inappropriate use of simulators, or unnecessary (and costly) reluctance to use simulation when it is appropriate. In particular, there is concern by many involved with research and engineering development simulators that subjective pilot opinion is often the primary criterion for acceptance of simulators for certification activities. However, clearance demonstrations on a simulator will not usually be experienced in flight until an operational pilot encounters the conditions or configurations of the clearance. Thus validation of the simulator for clearance tasks must involve rigorous model and simulation system validation as well as pilot subjective tests. Subjective adjustments are unacceptable. Working Group 16 was formed by the Flight Mechanics Panel of AGARD to produce an Advisory Report on this subject. The aim was to provide advice and guidance to Certification and Acceptance Authorities, and Aircraft Manufacturers on the appropriate use of piloted simulation as the sole demonstration for aircraft and system flight clearances. The Group included members from Canada, Germany, Italy, Netherlands, United Kingdom and the United States. Government R&D Establishments, Armed Service R&D Establishments, and aircraft and simulator manufacturers were all represented. Author

N95-17846# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.
A SELECTION OF EXPERIMENTAL TEST CASES FOR THE VALIDATION OF CFD CODES, VOLUME 2 [RECUEIL DE CAS D'ESSAI EXPERIMENTAUX POUR LA VALIDATION DES CODES DE L'AERODYNAMIQUE, VOLUME 2]
Aug. 1994 577 p See also N95-14201 and diskette supplement AGARD-AR-303-Suppl
(AGARD-AR-303-VOL-2; ISBN-92-836-1003-2) Copyright Avail: CASI HC A25/MF A06

This report presents the results of a study by Working Group 14 of the AGARD Fluid Dynamics Panel. The thirty nine test cases that are documented cover the subsonic, transonic, and supersonic flow regimes and five classes of geometries. Included in the five classes of geometries are: Two Dimensional Airfoils; Three Dimensional Wings, designed for predominantly attached flow conditions; Slender Bodies, typical of missile type configurations; Delta Wings, characterized by a conical type of vortex flow; and Complex Configurations, either in a geometrical sense or because of complicated flow interactions. The report is presented in two volumes. Volume 1 provides a review of the theoretical and experimental requirements, a general introduction, summary of the test cases and recommendations for the future. Volume 2 contains detailed information on the test cases. Relevant data has been compiled on floppy disks. For individual titles, see N95-17847 through N95-17885.

N95-18539 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.
A SELECTION OF EXPERIMENTAL TEST CASES FOR THE VALIDATION OF CFD CODES. SUPPLEMENT: DATASETS A-E (Diskette Supplement)
Aug. 1994 See also N95-14201 and N95-17846 Diskette supplement: nine 3.5-inch DSHD diskettes
(AGARD-AR-303-SUPPL; NONP-AGARD-SUPPL-VT-95-38380) Copyright Avail: CASI DK A18

Relevant data of all 39 test cases for the validation of Computational Fluid Dynamics (CFD) codes by Working Group 14 of the AGARD Fluid Dynamics Panel is compiled on these 9 diskettes to accompany Volumes 1 and 2 of the report. The test cases cover the subsonic, transonic, and supersonic flow regimes. CASI

N95-18597# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Structures and Materials Panel.
AIRCRAFT LOADS DUE TO TURBULENCE AND THEIR IMPACT ON DESIGN AND CERTIFICATION [EFFORTS AVION DUS A LA TURBULENCE ATMOSPHERIQUE ET LEURS IMPACTS SUR LA CONCEPTION ET LA CERTIFICATION]
Dec. 1994 93 p In ENGLISH and FRENCH Workshop held in Lillehammer, Norway, 5 May 1994
(AGARD-R-798; ISBN-92-836-0002-9) Copyright Avail: CASI HC A05/MF A01

The AGARD Structures and Materials Panel has always been heavily involved in the field of the effects of atmospheric disturbances on the behavior of aircraft. The Panel organized a Workshop on the theme 'Aircraft Loads due to Turbulence and their Impact on Design and Certification'. This Workshop was held on 5 May 1994. This document reproduces the papers presented. For individual titles, see N95-18598 through N95-18605.

N95-18927# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Guidance and Control Panel.
ON-LINE HANDLING OF AIR TRAFFIC: MANAGEMENT, GUIDANCE AND CONTROL [CONDUITE EN LIGNE DU TRAFIC AERIEN: GESTION, GUIDAGE, AND PILOTAGE]
ANDRE BENOIT, ed., C. GARCIA-AVELLO, J. LEMAITRE, M. PELEGRIN, E. PETRE, and S. SWIERTRA Nov. 1994 220 p Original contains color illustrations
(AGARD-AG-321; ISBN-92-835-0758-4) Copyright Avail: CASI HC A10/MF A03

Following a summary of the activities of the Guidance and Control Panel of AGARD in the field of Air Traffic Handling, this volume constitutes essentially an introduction for those new to the Air Traffic Control Research and Development community, offering, on the one hand, a broad view of the present situation and actual limitations, on the other hand, some precise idea of a long term system objective. It is composed of a preface, a general introduction and ten chapters, each constituting an introduction to the corresponding topics, successively entitled: the air transport system, air traffic complexity, traffic evolution, electronic aids to controllers, arrivals management systems, decision making aids, a look further into the future, towards global optimization, systems evaluation facilities, and the airport of the future. Author

N95-19017# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Propulsion and Energetics Panel.
MATHEMATICAL MODELS OF GAS TURBINE ENGINES AND THEIR COMPONENTS [LES MODELES MATHEMATIQUES DES TURBOMOTEURS ET DE LEURS ORGANES]
Dec. 1994 183 p Lecture series held in Cleveland, OH, 7-8 Dec. 1994, in Wessling, Germany, 12-13 Dec. 1994 and in Paris, France, 15-16 Dec. 1994
(AGARD-LS-198; ISBN-92-836-1008-3) Copyright Avail: CASI HC A09/MF A02

This Lecture Series will present and discuss the scientific problems of modern mathematical simulation of gas turbine engines and their components. Some peculiarities of complex multicomponent and multidisciplinary models for whole flow passage of bypass gas turbine engine, core, multistage compressors and turbines, and other engine components will be studied. Solutions of steady and unsteady problems are given using high efficiency monotone numerical methods and the theoretical bases of these methods are presented. Many practical results of aerodynamic and thermostress simulations for engine components are shown. These results are compared widely with experimental data for accurate verification of developing computational codes. This Lecture Series, endorsed by the Propulsion and Energetics Panel of AGARD, has been implemented by the Technology Cooperation Program. For individual titles, see N95-19018 through N95-19026.

N95-19142# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Structures and Materials Panel.
IMPACT OF ACOUSTIC LOADS ON AIRCRAFT STRUCTURES [IMPACT DES SOLICITATIONS ACOUSTIQUES SUR LES STRUCTURES D'AERONEFS]
Sep. 1994 265 p In ENGLISH and FRENCH Symposium held in Lillehammer, Norway, May 1994 Original contains color illustrations
(AGARD-CP-549; ISBN-92-836-0001-0) Copyright Avail: CASI HC A12/MF A03

A broad band of different activities was addressed in the Specialists' Meeting held by the Structures and Materials Panel of AGARD in May 1994: Topics dealt with the acoustic environment in subsonic and hypersonic flow regimes, innovative structural design techniques and materials for fatigue resistant structures, and experimental and analytical tools for evaluation of the behavior of structures in an acoustically and thermally adverse environment. For individual titles, see N95-19143 through N95-19167.

N95-19251# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.

WALL INTERFERENCE, SUPPORT INTERFERENCE AND FLOW FIELD MEASUREMENTS [LES EFFETS DE PAROI ET DE SUPPORT ET LES MESURES DES CHAMPS D'ECOULEMENT]

Jul. 1994 439 p In ENGLISH and FRENCH Symposium held in Brussels, Belgium, 4-7 Oct. 1993 Original contains color illustrations
(AGARD-CP-535; ISBN-92-835-0756-8) Copyright Avail: CASI HC A19/MF A04

The 31 papers prepared for the AGARD Fluid Dynamics Panel (FDP) Symposium on 'Wall Interference, Support Interference, and Flow Field Measurements' are contained in this report. In addition, a Technical Evaluator's Report assessing the success of the Symposium in meeting its objectives, and an edited transcript of the General Discussion held at the end of the meeting are also included. The primary objective of this Symposium was to report on recent developments from research and technology programs aimed at reducing test data errors caused by wind tunnel walls, model supports, and intrusive flow field measurement devices. The scope of papers included wall interference correction methods based on measured data at the walls and methods to eliminate wall interference through adaptive and/or ventilated walls, support interference calculations and correction methods, and recent advances in flow field measurement techniques. For individual titles, see N95-19252 through N95-19282.

N95-19413# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Aerospace Medical Panel.

THE CLINICAL BASIS FOR AEROMEDICAL DECISION MAKING [LES BASES CLINIQUES POUR LA PRISE DE DECISION DANS LE DOMAINE AEROMEDICAL]

Sep. 1994 257 p In ENGLISH and FRENCH Symposium held in Palma de Mallorca, Spain, Apr. 1994
(AGARD-CP-553; ISBN-92-836-0003-7) Copyright Avail: CASI HC A12/MF A03

This symposium addressed the rationale behind aeromedical decisions. Lack of available data required decision-makers to be conservative when deciding who should fly or not. Papers in this symposium updated available data and provided a focal point for discussion and re-evaluation of aeromedical selection and retention standards. Discussion periods allowed for open exchange on particular topics of concern, i.e., cardiovascular and neurological problems and HIV. Our purpose was to exchange data, experience, and management rationales dealing with the very difficult task of aeromedical decision-making. Information sharing would enable nations to update management protocols based upon experience and collectively more powerful data. The elimination of costly redundant research, the focusing of future research, and collaborative efforts between AGARD member nations is the hope of this exchange. For individual titles, see N95-19414 through N95-19443.

N95-19653# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Propulsion and Energetics Panel.

EROSION, CORROSION AND FOREIGN OBJECT DAMAGE EFFECTS IN GAS TURBINES [LES CONSEQUENCES DE L'ENDOMMAGEMENT DES TURBINES A GAZ PAR EROSION, CORROSION ET OBJETS ETRANGERS]

Nov. 1994 338 p In ENGLISH and FRENCH Symposium held in Rotterdam, Netherlands, 25-28 Apr. 1994 Original contains color illustrations
(AGARD-CP-558; ISBN-92-836-0005-3) Copyright Avail: CASI HC A15/MF A03

The Conference Proceedings contains 31 papers presented at the Propulsion and Energetics Panel Symposium on Erosion, Corrosion and Foreign Object Damage Effects in Gas Turbines which was held from 25-28th April 1994, in Rotterdam, The Netherlands. The Technical Evaluation Report and the Keynote Address are included at the beginning and discussions follow most papers. The Symposium was arranged in the following Sessions: Operational Experience and Requirements (7); Deposition and Erosion (7); Foreign Object Damage (5); Coatings, Repairs and Materials Aspects - 1 (4); Coatings, Repairs and Materials Aspects - 2 (7); and Testing and Certification Procedures (1). For individual titles, see N95-19654 through N95-19684.

N95-20631# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Avionics Panel.

ADVANCED PACKAGING CONCEPTS FOR DIGITAL AVIONICS [LES TECHNIQUES AVANCEES DE MISE SOUS BOITIER]

Oct. 1994 287 p In ENGLISH and FRENCH Symposium held in San Diego, CA, 6-9 Jun. 1994
(AGARD-CP-562; ISBN-92-836-0004-5) Copyright Avail: CASI HC A13/MF A03

A critical impediment to significantly improving the performance of digital airborne electronics or avionics is the limitation posed by current electronics packaging concepts. This symposium brought together experts from seemingly diverse, but interlocking disciplines ranging from logisticians to digital designers to mechanical engineers to establish the current baseline in digital packaging, failure modes of the electronics and support problems. Trends in both supportability and processing were described for early 21st century application. Along with the projections of asymptotic increase in signal, image and data processing, dramatic increases in thermal densities, chip interconnects, correctors and backplane traffic were described. For individual titles, see N95-20632 through N95-20659.

N95-20921# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Electromagnetic Wave Propagation Panel.

MULTIPLE MECHANISM PROPAGATION PATHS (MMPPS): THEIR CHARACTERISATION AND INFLUENCE ON SYSTEM DESIGN [LES TRAJETS DE PROPAGATION DES ONDES A MECANISMES MULTIPLES (MMPP): CARACTERES ET INCIDENCES SUR LA CONCEPTION DES SYSTEMES]

Jul. 1994 415 p In ENGLISH and FRENCH Symposium held in Rotterdam, Netherlands, 4-7 Oct. 1993 Original contains color illustrations
(AGARD-CP-543; ISBN-92-835-0750-9) Copyright Avail: CASI HC A18/MF A04

This publication reports the papers presented to a specialists' meeting held by the Electromagnetic Wave propagation Panel at its Fall 1993 meeting. The topics covered on the occasion of that symposium on the subject of 'Multiple Mechanism Propagation Paths (MMPP's): Their Characterization and Influence on System Design' included: (1) propagation and noise aspects; (2) examples of MMPP systems; (3) system design to exploit or reduce the effects of MMPP's; and (4) future work. For individual titles, see N95-20922 through N95-20961.

N95-21061# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.

APPLICATION OF DIRECT AND LARGE EDDY SIMULATION TO TRANSITION AND TURBULENCE [L'APPLICATION DE LA SIMULATION DIRECTE ET DE LA SIMULATION DES GROS TOURBILLONS A LA TRANSITION ET A LA TURBULENCE]

Dec. 1994 400 p In ENGLISH and FRENCH The 74th symposium was held in Chania, Greece, 18-21 Apr. 1994 Original

contains color illustrations
(AGARD-CP-551; ISBN-92-836-0006-1) Avail: CASI HC A17/MF A04

The papers prepared for the AGARD Fluid Dynamics Panel (FDP) Symposium on 'Application of Direct and Large Eddy Simulation to Transition and Turbulence', which was held April 1994 in Greece are contained in this report. In addition, a Technical Evaluator's Report assessing the success of the Symposium objectives, and an edited transcript of the General Discussion are also included. In the past two decades significant progress has been made in the numerical simulation of turbulent flows. Vast improvements in speed and memory size of modern supercomputers, and recent progress in simulation algorithms and parallel computation have put us on the threshold of being able to simulate flows in configurations of engineering interest. For individual titles, see N95-21062 through N95-21098.